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Recent BABAR Studies of Bottomonium States

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We present a study of the radiative transitions from decays of the $Y(2S)$ and $Y(3S)$ resonances using photons that have converted into an e^+e^- pair, obtaining precise measurements of the branching fractions for $\chi_{b1,2}(1, 2P) \rightarrow \gamma Y(1S)$ and $\chi_{b1,2}(2P) \rightarrow \gamma Y(2S)$ transitions and search for radiative decay to the $\eta_b(1S)$ and $\eta_b(2S)$ states. We present a search for the spin-singlet partner of the $\chi_{bJ}(1P)$ triplet, the $h_b(1P)$ state of bottomonium in the transitions $Y(3S) \rightarrow \pi^0 h_b$ and $Y(3S) \rightarrow \pi^+\pi^- h_b$ using a data sample of 122 million $Y(3S)$ events.

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